

## 2.3.17. False Alarm Rate

### 2.3.17.1. Purpose

The purpose of this test is to qualitatively assess the false alarm rate of the radar and to determine the effect these false alarms have upon detecting real targets.

### 2.3.17.2. General

Even Restricted airspace has corridors and minimum levels where both Interrogator Friend or Foe (IFF) (also called transponder) and non-IFF equipped traffic transit. For this reason, the procedure presented here will involve a qualitative evaluation only. False alarms are generally of short duration, often just one hit, and as such a rough count or level can be approximated by closely evaluating the coherency of the tracks from scan to scan. If doubt exists on a particular track, a few can be resolved by contacting the test area controlling agency and asking them if they hold traffic at the bearing and range in question. This is not a perfect check since ATC often is unable to detect low flying non-transponder equipped traffic. The test should be performed in and out of the clutter environment (look-up and look-down). The false alarm rate is less in most radars for look-up and if the look-up test is performed above 18,000 feet than all airplanes will be transponder equipped and ATC will be able to resolve any of the false alarms noted. Clutter generally causes the false alarm rate to be greater in the look-down case than the look-up situation.

A rigorous, quantitative evaluation of the false alarm rate requires a large range, where the location of all airborne targets can be recorded. Additionally, significant recording of the radar output is usually needed in the form of digital data and display video. Without the availability of the complete instrumentation suite, video recording of the radar display alone, can greatly enhance this test. Since the false alarms tend to appear and disappear rapidly, viewing a recorded display repeatedly allows a better accounting of the number of false alarms. The value of the airborne, qualitative assessment cannot be discounted; however, since the evaluation is greatly influenced by the airborne environment.

The false alarm rate can vary greatly over the course of a flight and from flight to flight. Due to this statistical nature of the false alarm rate, a rigorous test not only requires extensive instrumentation, as mentioned above, but also repeated tests, to establish statistical significance.

### 2.3.17.3. Instrumentation

Data cards and an optional voice recorder are required for this test.

### 2.3.17.4. Data Required

Record the estimated false alarm rate (number of false alarms on any given scan) in both the look-up and look-down (clutter and non-clutter) environment for each radar mode. Record qualitative comments concerning the difficulty of detecting a legitimate target airplane in the presence of the false alarms.

### 2.3.17.5. Procedure

During slack periods between runs at medium altitude, set up the radar for a wide scan angle limit setting and long range scale. Elevate the antenna first to look for long range, high flying targets. Qualitatively assess the number of false alarms over a number of scans. If doubt occurs on any particular target, call the controlling agency for the test airspace and request a check of the questionable area for targets. Lower the elevation angle to a selection that allows for detection of medium range low flyers. Care should be taken not to tilt the antenna below an angle that would be used for medium range detection. Repeat the qualitative assessment over a number of scans. Repeat the series for all radar modes.

### 2.3.17.6. Data Analysis and Presentation

Relate the false alarm rate to the difficulty of picking a real target out of the spurious radar hits and the probability of beginning an intercept on a false target. The life of the false alarms relative to the coherency of real targets on a scan to scan basis will affect the evaluation. The evaluation should be performed taking into account the expected workload and stress during a mission relatable scenario. The effects upon target detection should be assessed during mission relatable intercepts.

**2.3.17.7. Data Cards**

A sample data card is presented as card  
21.

CARD NUMBER \_\_\_\_ TIME \_\_\_\_ PRIORITY L/M/H

## FALSE ALARM RATE

[PLACE THE RADAR IN A LONG RANGE SCALE AND WIDE SCAN ANGLE PATTERN. TILT THE ANTENNA UP SO THAT THE MINIMUM DETECTION HEIGHT IS JUST ABOVE THE CLUTTER ALTITUDE. ESTIMATE THE FALSE ALARMS PRESENT AT ANY GIVEN TIME. USE ATC TO RESOLVE CONFLICTS. TILT THE ANTENNA DOWN FOR LOW FLYER MEDIUM RANGE DETECTION AND REPEAT. ENSURE THE ANGLE IS NOT TOO LOW. REPEAT THE TEST FOR ALL MODES.]

RADAR MODE	NON-CLUTTER FALSE ALARMS	CLUTTER FALSE ALARMS

[QUALITATIVELY ASSESS THE EFFECTS THAT THE CLUTTER HAS UPON DETECTION DURING MISSION RELATABLE INTERCEPTS.]

EFFECTS: